

[0051] The first battery charge block 222 can have a first output switch. The voltage detector can have the first output switch. The power switch can have the first output switch. The first output switch can enable or disable charging of the battery. The output switch can have a set reference voltage.

[0052] The power management system 100 can have current sensors. The current sensors can detect the current. The current sensors can be located before the automatic power management circuit 201. The current sensor can be located before or after the current management circuit 105.

[0053] The second battery charge block 223 can have a second automatic power management circuit 221, a second supercharging circuit 109, a second current balance management circuit 110, or any combination thereof. The second automatic power management circuit 221 can have a sixth relay element 218, a seventh relay element 217, an eighth relay element (e.g., a second voltage detector 216), a ninth relay element 215, a tenth relay element 214, a second output switch, or any combination thereof. The components of the second battery charge block 223 can be similar to the components of the first battery charge block 222.

[0054] The first battery charge block 222 can be the primary charge block. The first battery charge block 222 can be the secondary charge block. The second battery charge block 223 can be the primary charge block. The second battery charge block 223 can be the secondary charge block. The first battery charge block 222 and the second battery charge block 223 can be on the same electronic board. The first battery charge block 222 and the second battery charge block 223 can be on different electronic boards. For example, the first automatic power management circuit 201, the first supercharging circuit 103, the first current balance management circuit 105, the first voltage detector 207, or any combination thereof can be on a first electronic board. The second automatic power management circuit 221, the second supercharging circuit 109, the second current balance management circuit 110, the second voltage detector 216, or any combination thereof can be on a second electronic board. The power source 101, cooling element 226, thermal control 225, the GPS transmitter 227, the power switch block 224, the first battery 206, the second battery 213, the device 200, or any combinations thereof can be on the first electronic board, the second electronic board, a third electronic board, or any combination thereof. The power source 101, cooling element 226, thermal control 225, the GPS transmitter 227, the power switch block 224, the first battery 206, the second battery 213, the device 200, or any combinations thereof can be connected to the first battery charge block 222 and/or the second battery charge block 223.

[0055] The current balance management circuits 105, 110 can control the current. The current balance management circuits 105, 110 can generate current and voltage levels to match the logic table conditions. The current balance management circuits 105, 110 can balance current discharge between the first battery 206 and the second battery 213. When the power source 101 is unavailable and both the first battery 206 and the second battery 213 are below the set reference voltages (e.g., full battery voltage, optimal battery voltage), the current balance management circuits 105, 110 can cascade and/or combine battery current to power the device 200. For example, if there is insufficient energy from the power source 101, then the current balance management circuits 105, 110 can switch to the first battery 206 to power

the device 200. If the first battery 206 is below the set reference voltage, then the current balance management circuits 105, 110 can switch to the second battery 213 to power the device 200. If the second battery 213 then falls below the set reference voltage, then the remaining current from the first battery 206 and the second battery 213 can be combined to provide power to the device 200.

[0056] The set reference voltage can be from about 0 V to about 12 V, for example, about 1 V, about 2 V, about 3 V, about 4 V, about 5 V, about 6 V, about 7 V, about 8 V, about 9 V, about 10 V, about 11 V, or about 11.5 V. The set reference voltage can be different for the first battery 206 and the second battery 213. The set reference voltage can be the same for the first battery 206 and the second battery 213.

[0057] FIG. 2a illustrates that when the power management system 100 is activated in block 2002, the power management system 100 can select between the power sources 101a or 101b based on which power source has the highest input current (e.g., optimal input current) in block 2004. The power source 101 can directly power the device 200 in block 2006. Concurrently, the power management system 100 can send energy from the power source 101 to a first capacitor bank 300a in block 2008. At the same time or at a different time of sending energy from the power source 101 to a first capacitor bank 300a, the power management system 100 can discharge the current from a second capacitor bank 300b to the first battery 206 as shown in FIG. 2b when the first battery 206 voltage falls below the set reference voltage as shown in FIG. 2a and FIG. 2b. At the same time or at a different time, the power management system 100 can discharge the current from a third capacitor bank 300c to the second battery 213 as shown in FIG. 2c when the second battery 213 falls below the set reference voltage as shown in FIG. 2a and FIG. 2b in block 2010. If the second capacitor bank 300b no longer discharges current to the first battery 206 or falls below a capacitor bank threshold (e.g., optimal capacitor voltage) the power management system 100 can switch the first capacitor bank 300a with the second capacitor bank 300b such that the first capacitor bank 300a discharges current to the first battery 206 and the power source 101 sends energy to the second capacitor bank 300b as shown in FIG. 2c in block 2012. If none of the power sources 101 have an input current, the power management system 100 can select between the first battery 206 and/or the second battery 213 to power the device 200 based on which battery has the highest voltage in block 2014 to power the device 200 in a block 2016. The power management system 100 can constantly (e.g., continuously, uninterrupted) charge the batteries and the capacitors. The power management system 100 can constantly power the device 200. The capacitor bank threshold can be between 0 V to about 3 V, for example, about 1 V, about 2 V, about 2.5 V, or about 3 V.

[0058] Any one component or a combination of components can achieve such a result. For example, the automatic power management circuits 201, 221 can select the power source 101 with the highest input. The super charging circuits 103, 109 can send energy from the power source 101 to the capacitor bank 300. The current management circuits 105, 110 can manage the power to the device 200.

[0059] FIG. 3a illustrates that the power management system 100 can have a manual override circuit (MOC). The MOC can be within the automatic power management circuits 201, 221. The power management system 100 can